

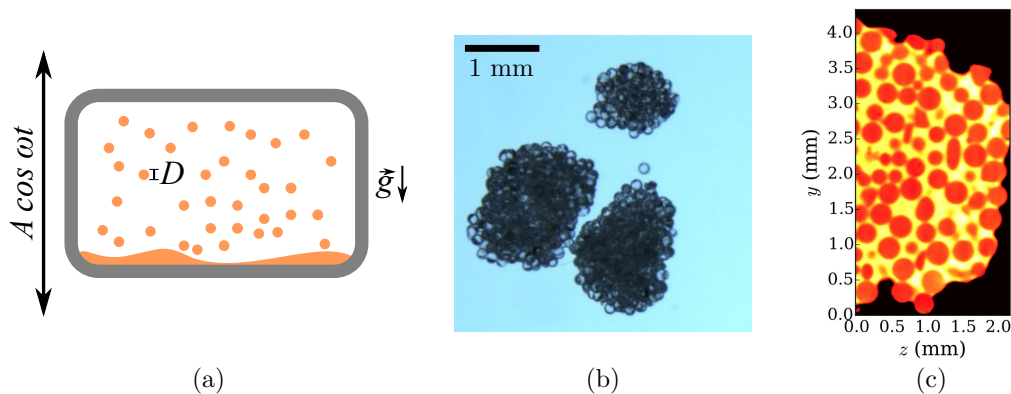
INTERNSHIP PROPOSAL

GRANULATION OF VIBRATED GRAINS

Contact information : Pascal Raux
 pascal.raux@saint-gobain.com

Laboratory : Surface du Verre et Interfaces, CNRS/Saint-Gobain Research (UMR 125)
Website : <http://svi.cnrs.fr/>

Granulation is an industrial process that leads to the formation of agglomerates upon mixing a powder with a liquid binder. This method is standard in the industry and concerns many domains of application such as the fabrication of ceramic beads, of pharmaceutical pills or couscous grains. In the high-shear granulation process, the fast rotation of a blade allows mixing the fine powder to the binder. With adequate operating conditions, it is possible to control the properties of the agglomerates (size, porosity). However, the industrial processes remain mostly empirical and the physical basis poorly understood. This internship thus aims at investigating a model system to understand the fundamental ingredients underlying the granulation process.



(a) Schematics of the experiment. (b) Vibration induces the agglomeration of glass beads mixed with water. (c) Example of an image obtained by tomography of a saturated granular material.

The student will work on an experimental set-up allowing to shake at high amplitude a model granular material made of glass beads and mixed with a Newtonian liquid [Fig. (a)]. The vibrations lead to the formation of granulates, as the shown in Fig. (b), through an equilibrium between fragmentation and accretion. The student will investigate the effect of the different parameters on the size of the granulates, especially the liquid content and the amplitude of the vibrations. The porosity of the agglomerates will be studied through X-ray tomography [Fig. (c)]. The experimental results will be rationalized by theoretical argument involving fluid mechanics, granular media and interfacial tension effects.

The internship will take place in the joint CNRS/Saint-Gobain Research laboratory, at Aubervilliers. It is funded by Saint-Gobain Research and will be supervised by Pascal Raux, Pierre Jop and Alban Sauret. We are looking for a candidate with a taste for experimental work. This internship could be followed by a PhD thesis in SVI laboratory on a related topic (CIFRE funding).